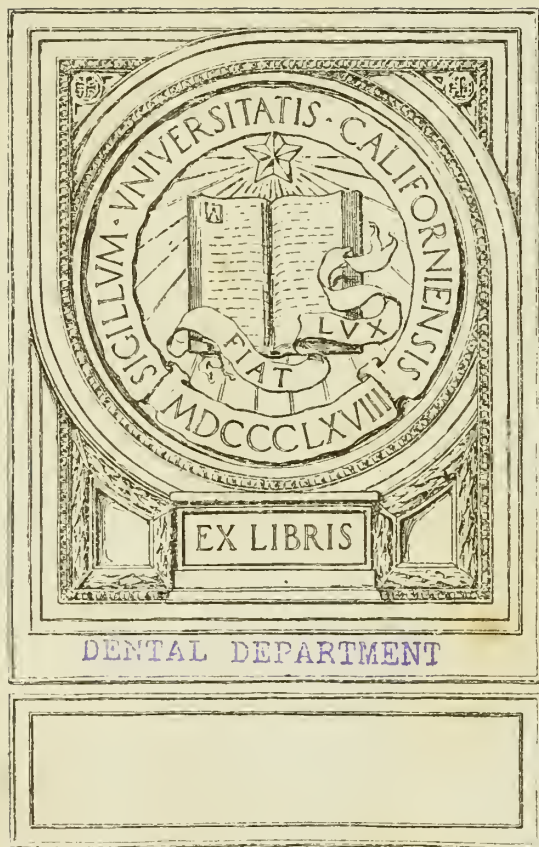


X RAY ATLAS OF THE SKULL

A. RUSSELL GREEN



DENTAL DEPARTMENT



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AN X-RAY
ATLAS OF THE SKULL

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BY

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WITH

5 Coloured Plates and

A Table showing relations between displacement of shadows
and distance of bodies throwing those shadows

LONGMANS, GREEN AND CO.

39 PATERNOSTER ROW, LONDON

FOURTH AVENUE AND 30TH STREET, NEW YORK

BOMBAY, CALCUTTA, AND MADRAS

1918

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PREFACE

THE interpretation of Skiagrams of the Head presents many difficulties, the bony landmarks are so numerous and vary so much with the point of view from which the Skiagram is taken, that it is convenient to have for reference a series of diagrams showing what may be seen or located in the dry skull when radiographed from various angles. The method adopted has been to increase the opacity of certain parts, by outlining the sutures with wire, covering structures with tinfoil, injecting the Sinuses with a mixture of bismuth and paraffin wax, and in the fresh state by injecting the blood vessels with mercury. These processes have been confined largely to one side of the skull, so that throughout the Atlas one-half appears as a diagram and the remainder as a more or less untouched print. The angle of incidence of the axial ray is in each case defined with regard to a Plane passing through the Nasion and the centre of the External Auditory Meatus, and referred to as the Naso-Meatal Plane.

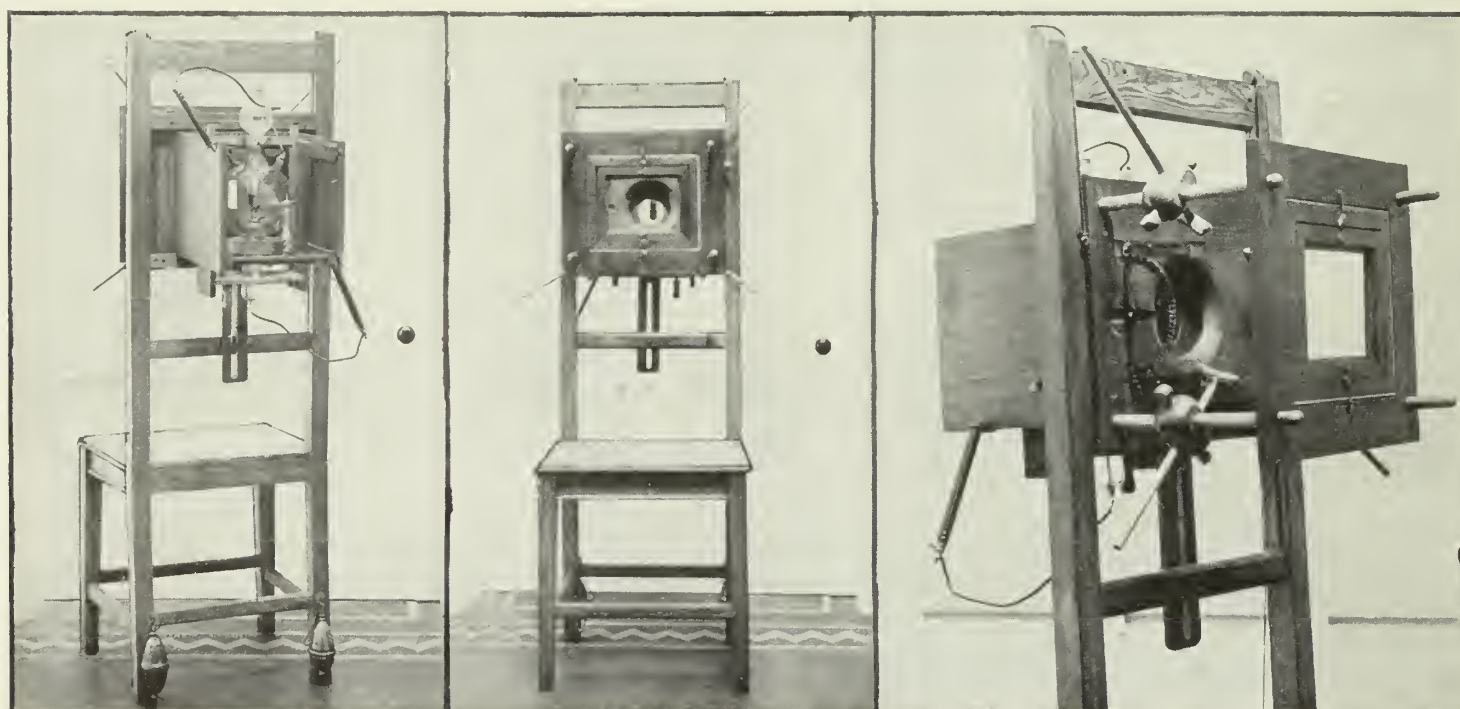
The method of localisation here given has withstood the test of over two and a-half years' trial in a military hospital of nearly two thousand beds. It has the advantage that (if the plates are taken under the conditions indicated) the only additional apparatus needed is a pair of compasses or dividers and a millimetre rule.

A. A. RUSSELL GREEN

BIRMINGHAM,
January 1918.

APPARATUS

The apparatus used for the purpose is shown in the figures, and consists essentially of a tube-holder, a plate-holder, and an intervening diaphragm, the whole system sliding upwards and downwards between the uprights of the back of a chair.



The block of wood which is engaged within the uprights of the back of the chair holds together the whole of the essential apparatus. On the back is the tube-holder (with lateral movement for stereoscopy). On the front is the plate-holder, to the rods of which are attached moveable struts with padded ends for immobilising the head, and the block itself is perforated by a 4 inch aperture and furnished with a protractor for the determination of the necessary angles.

NOTES

The Localisation of Foreign Bodies in the Head.

In the facial portion Localisation depends chiefly upon a proper appreciation of the shadows thrown by the component bones; and given good lateral and antero-posterior skiagrams, it is possible to give a definite opinion as to the relation of a foreign body to some salient bony point. In the Cranium, however, such salient points are not numerous, and one has to be content generally with the surface markings of the foreign body and its depth from the surface.

Method of Procedure for Foreign Bodies in and near the Cranium.

For this the couch is used, and the head is screened from underneath by a central pencil of rays, and the foreign body is located. The shadow of the foreign body is then encircled by the shadows of metal rings placed on the near and remote aspects of the head. The operation is performed first with Sagittal Plane of the skull parallel with the surface of the table; secondly, with the Sagittal Plane at right angles to the table. In some cases this will be sufficient. If further investigation is necessary, the surface marking corresponding to the most accessible route is selected, it is evident that this spot will only be in contact with the table (or plate) when it happens to lie upon the greatest transverse or antero-posterior diameter, and should this not be the case, a fragment of lead foil is attached to the surface marking by a piece of strapping and localisation plates taken. The distances of the foreign body from the plate and of the point of lead from the plate are now estimated, the difference between the two giving the distance of the foreign body from the surface. The relation of a foreign body to a bony point is estimated in exactly the same way. If two measurements be kept constant, namely, from target to plate 50 centimetres and from primary to secondary position of tube 10 centimetres, then the distance of foreign bodies from the plate can be read off directly from the following table.

TABLE

Showing the relations between the displacements of shadows thrown by bodies and the distances of such bodies from the photographic plate or fluorescent screen.

The following conditions must be maintained :—

1. Distance between target and sensitive surface of plate or screen must be fifty centimetres.
2. Target to be centred over the body whose relations are required before taking the first radiograph or observation.
3. Tube to be displaced ten centimetres before taking the second radiograph or observation.

S. S. IN MILLIMETRES.	DEPTH. INCHES.	DEPTH. MILLIMETRES.	S. S. IN MILLIMETRES.	DEPTH INCHES.	DEPTH. MILLIMETRES
5	$\frac{9}{64}$	3.7	25.5	4	101.4
10	$\frac{13}{64}$	5.0	26.0	$4\frac{5}{64}$	103.0
15	$\frac{5}{16}$	8.0	26.5	$4\frac{7}{64}$	104.5
20	$\frac{25}{64}$	10.0	27.0	$4\frac{5}{32}$	105.5
25	$\frac{1}{2}$	12.8	27.5	$4\frac{15}{64}$	107.6
30	$\frac{19}{32}$	15.0	28.0	$4\frac{3}{16}$	109.5
35	$\frac{43}{64}$	17.0	28.5	$4\frac{23}{64}$	110.0
40	$\frac{23}{32}$	18.0	29.0	$4\frac{27}{64}$	112.0
45	$\frac{27}{32}$	21.4	29.5	$4\frac{31}{64}$	113.8
50	$\frac{59}{64}$	23.5	30.0	$4\frac{37}{64}$	116.0
55	$1\frac{1}{64}$	25.6	30.5	$4\frac{7}{8}$	117.5
60	$1\frac{7}{64}$	28.0	31.0	$4\frac{43}{64}$	119.0
65	$1\frac{3}{16}$	30.0	31.5	$4\frac{29}{32}$	120.0
70	$1\frac{17}{64}$	32.0	32.0	$4\frac{49}{64}$	121.0
75	$1\frac{23}{64}$	34.4	32.5	$4\frac{27}{32}$	123.0
80	$1\frac{7}{16}$	36.0	33.0	$4\frac{15}{16}$	125.5
85	$1\frac{17}{32}$	39.0	33.5	$4\frac{63}{64}$	126.5
90	$1\frac{5}{8}$	41.5	34.0	$5\frac{1}{32}$	128.0
95	$1\frac{45}{64}$	43.4	34.5	$5\frac{5}{64}$	128.9
100	$1\frac{25}{32}$	45.0	35.0	$5\frac{11}{64}$	131.0
105	$1\frac{7}{8}$	47.5	35.5	$5\frac{13}{64}$	132.0
110	$1\frac{15}{16}$	49.0	36.0	$5\frac{15}{64}$	133.0
115	$2\frac{1}{64}$	51.0	36.5	$5\frac{19}{64}$	134.0
120	$2\frac{9}{64}$	54.0	37.0	$5\frac{27}{64}$	137.0
125	$2\frac{13}{64}$	56.0	37.5	$5\frac{7}{16}$	138.0
130	$2\frac{17}{64}$	57.0	38.0	$5\frac{29}{64}$	138.8
135	$2\frac{11}{32}$	59.3	38.5	$5\frac{31}{64}$	139.4
140	$2\frac{7}{16}$	62.0	39.0	$5\frac{37}{64}$	142.0
145	$2\frac{1}{2}$	63.5	39.5	$5\frac{39}{64}$	142.5
150	$2\frac{17}{32}$	64.0	40.0	$5\frac{21}{32}$	144.0
155	$2\frac{41}{64}$	67.0	40.5	$5\frac{45}{64}$	144.9
160	$2\frac{49}{64}$	70.5	41.0	$5\frac{51}{64}$	147.0
165	$2\frac{51}{64}$	71.0	41.5	$5\frac{53}{64}$	148.0
170	$2\frac{27}{32}$	72.0	42.0	$5\frac{7}{8}$	149.0
175	$2\frac{15}{16}$	74.8	42.5	$5\frac{59}{64}$	150.6
180	$3\frac{1}{32}$	77.0	43.0	$5\frac{63}{64}$	152.0
185	$3\frac{5}{64}$	78.0	43.5	$6\frac{1}{32}$	153.0
190	$3\frac{1}{8}$	79.0	44.0	$6\frac{5}{64}$	154.0
195	$3\frac{15}{64}$	82.2	44.5	$6\frac{7}{64}$	156.0
200	$3\frac{21}{64}$	84.0	45.0	$6\frac{3}{16}$	157.0
205	$3\frac{23}{64}$	85.0	45.5	$6\frac{7}{32}$	158.0
210	$3\frac{25}{64}$	86.0	46.0	$6\frac{9}{32}$	159.5
215	$3\frac{1}{2}$	89.0	46.5	$6\frac{5}{16}$	160.0
220	$3\frac{37}{64}$	91.0	47.0	$6\frac{23}{64}$	162.0
225	$3\frac{39}{64}$	91.8	47.5	$6\frac{25}{64}$	162.8
230	$3\frac{43}{64}$	93.0	48.0	$6\frac{29}{64}$	164.0
235	$3\frac{49}{64}$	95.8	48.5	$6\frac{31}{64}$	164.8
240	$3\frac{27}{32}$	98.0	49.0	$6\frac{17}{32}$	166.0
245	$3\frac{7}{8}$	98.5	49.5	$6\frac{37}{64}$	167.0
250	$3\frac{59}{64}$	99.0	50.0	$6\frac{41}{64}$	168.5

"S.S." = Shadow Shift = Distance between corresponding points of Primary and Secondary Shadows.

Depth = Distance of Foreign Body from plate.

LIST OF PLATES

PLATE No. 1.

Radiographs of living subject.

PLATE No. 2.

Radiographs of living subject.

PLATES Nos. 3 and 4.

Radiographs of dried and prepared skull. Schematic colouring. Plate No. 3, lateral;
Plate No. 4, photographic plate to face (90°).

PLATES Nos. 5 and 6.

Radiographs of dried and prepared skull. Schematic colouring.
Photographic plate to face (60° and 30°).

PLATES Nos. 7 and 8.

Radiographs of dried and prepared skull. Schematic colouring.
Photographic plate to face (0° and -30°).

PLATES Nos. 9 and 10.

Radiographs of dried and prepared skull. Schematic colouring.
Photographic plate to back of head (30° and 0°).

PLATE No. 11.

Series of radiographs illustrating relations of Sinuses, &c., when the skull is rotated round an axis passing through the External Auditory Meatus, and also the relations of Sinuses, &c., in lateral radiograph. Schematic colouring.

PLATE No. 1.

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PLATE No. 1.

Radiographs of Living Subject.

Plate to face, taken at the angles indicated.

The dark spots on FIG. 3 are due to points of Shrapnel.



FIG. 1.
+90

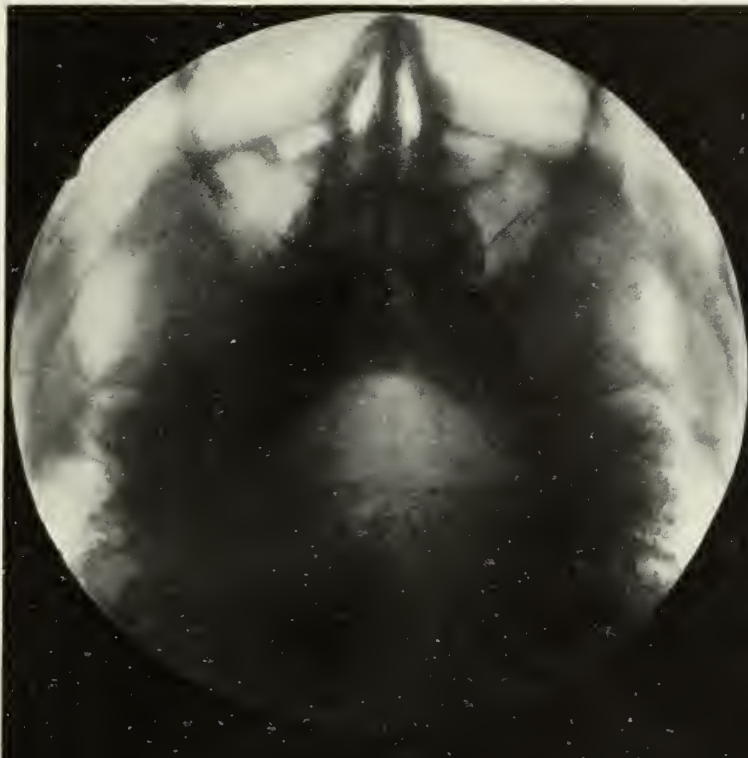


FIG. 2.
+60



FIG. 3.
+30

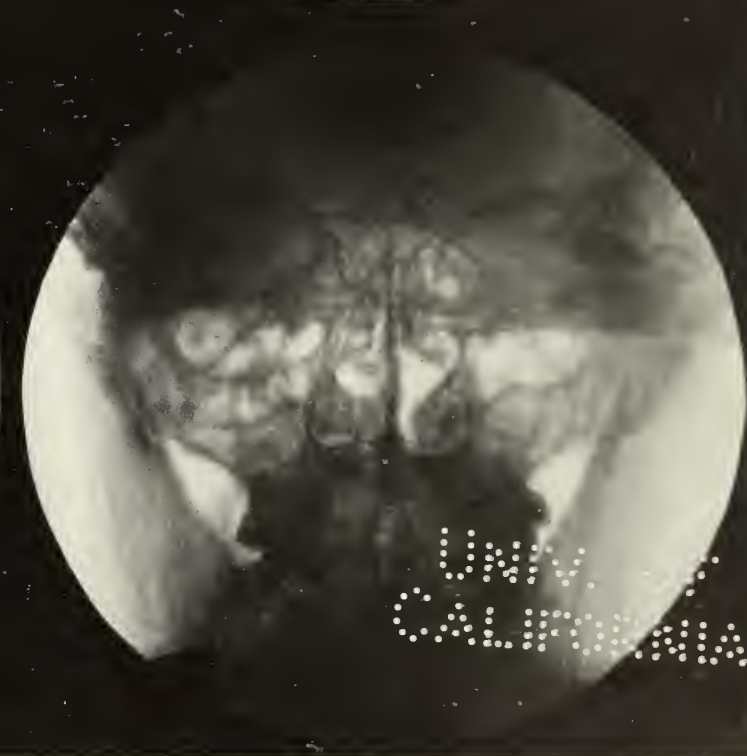


FIG. 4.
0

PLATE No. 1.

PLATE No. 2.

PLATE No. 2.

Radiographs of Living Subject.

Taken at angles indicated.

FIG. 1 —Plate to face.

FIG. 2.—Lateral.

FIGS. 3 and 4 —Plate to back of head.

The dark spots on FIG. 2 are shadows of pieces of Shrapnel.

FIG. 1.
30



FIG. 2.

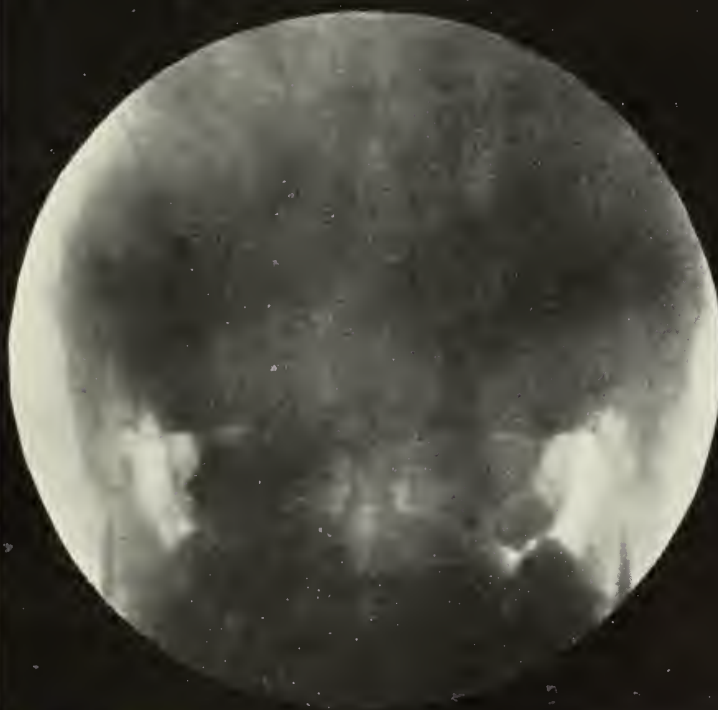


FIG. 3.
+30



FIG. 4.
0

PLATE No. 2.

PLATES Nos. 3 and 4.

PLATE No. 3.

Lateral Radiograph of Skull.

Target opposite the External Auditory Meatus.

PLATE No. 4.

FIG. 1.—Plate to Anterior aspect. Naso-Meatal Plane making angle of 90° with axis of rays.

FIGS. 2, 3, and 4 illustrating attitude of head and skull when Naso-Meatal Plane makes angle of 90° with axis of rays.

FIG. 1.

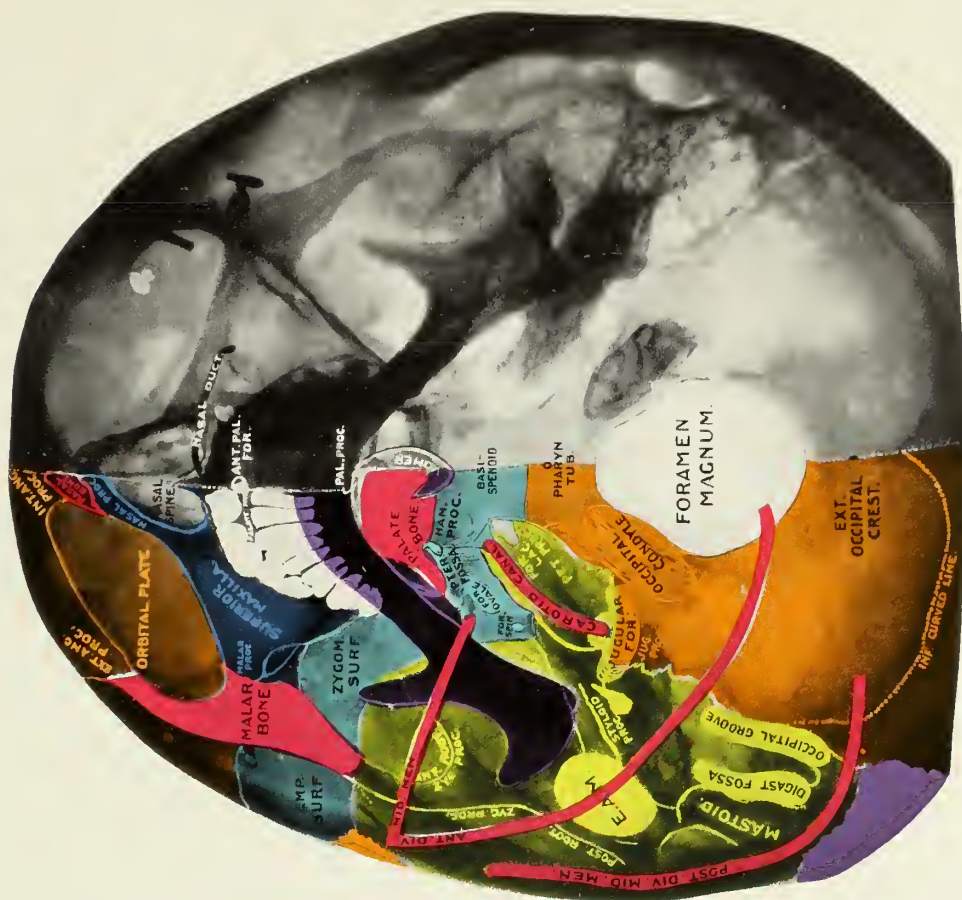


FIG. 2. FIG. 3. FIG. 4.

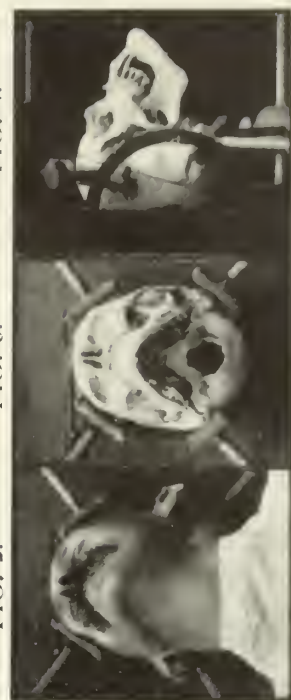


PLATE No. 3.

PLATE No. 4.

PLATES Nos. 5 and 6.

PLATE No. 5.

FIG. 1.—Plate to face. Naso-Meatal Plane making an angle of 60° with axis of rays.

FIGS. 2, 3, and 4 illustrating attitude of head and skull when Naso-Meatal Plane makes angle of 60° with axis of rays.

PLATE No. 6.

FIG. 1.—Plate to face. Naso-Meatal Plane making an angle of 30° with axis of rays.

FIGS. 2, 3, and 4 illustrating attitude of head and skull when Naso-Meatal Plane makes an angle of 30° with axis of rays.

FIG. 1.



FIG. 1.



FIG. 2. FIG. 3. FIG. 4.



FIG. 2. FIG. 3. FIG. 4.



PLATE No. 5.

PLATE No. 6.

PLATES Nos. 7 and 8.

PLATE No. 7.

FIG. 1.—Plate to face. Naso-Meatal Plane coincident with axis of rays.

FIGS. 2, 3, and 4 illustrating attitude of head and skull when Naso-Meatal Plane is coincident with axis of rays.

PLATE No. 8.

FIG. 1.—Plate to face. Naso-Meatal Plane making an angle of -30° with axis of rays.

To radiograph the Mastoids, each side is taken separately, with the Naso-Meatal Plane 30° below the axial ray and the head rotated 15° to the opposite side. In this way the Mastoid is traversed by rays tangential to the general curvature of the skull, and there are no super-imposed shadows.

FIGS. 2, 3, and 4 illustrating attitude of head and skull when Naso-Meatal Plane makes an angle of -30° with axis of rays.

FIG. 1.

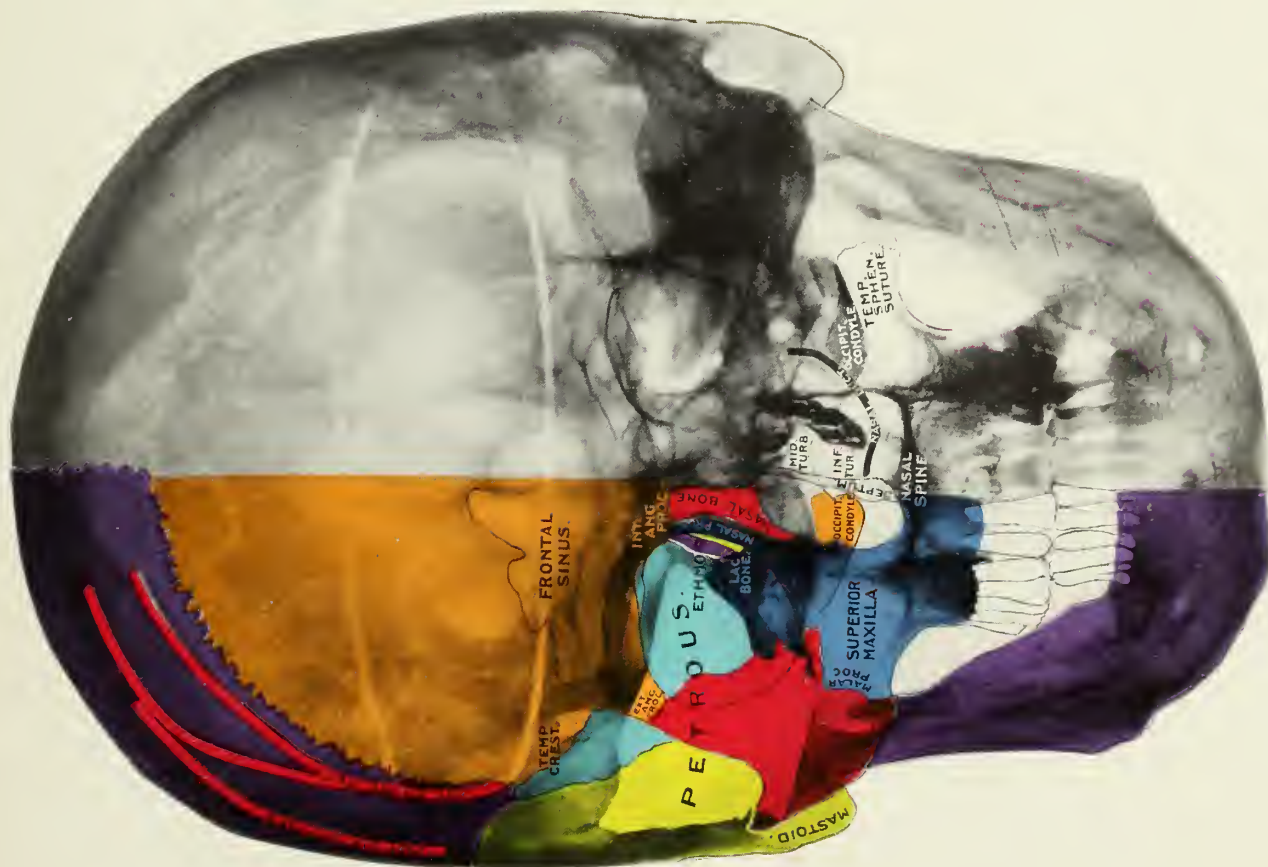


FIG. 2.



FIG. 3.

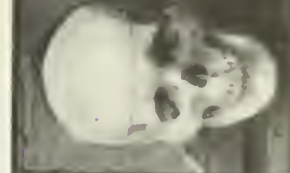


Fig. 4.

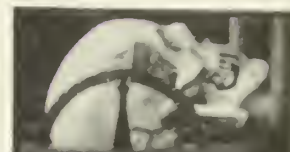


PLATE No. 7.

FIG. 1.

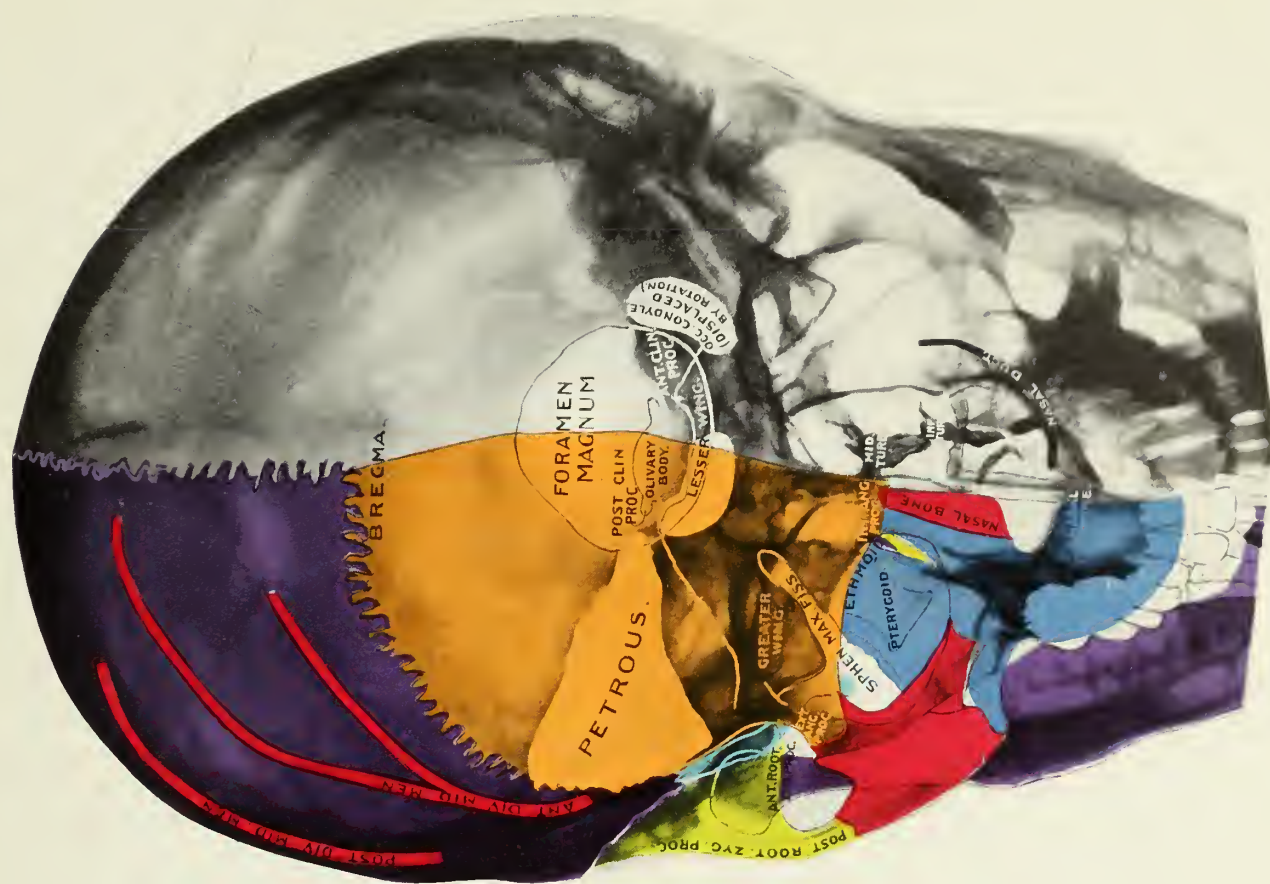


FIG. 2.



FIG. 3.



FIG. 4.



PLATE NO. 8.

PLATES Nos. 9 and 10.

PLATE No. 9.

Plate to back of head. Naso-Meatal Plane making an angle of 30° with axis of rays.

Useful position for Styloid Process, Odontoid Process (*see* PLATE 2, FIG. 3).

PLATE No. 10.

Plate to back of head. Naso-Meatal Plane coincident with axis of rays.

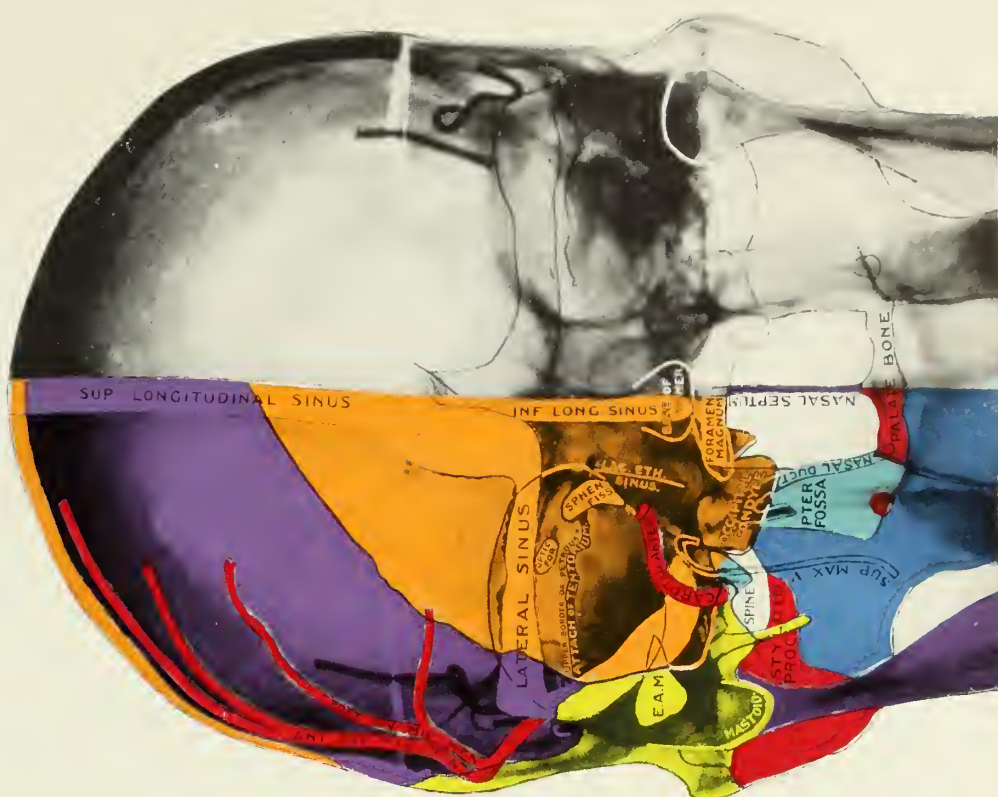


PLATE No. 10.

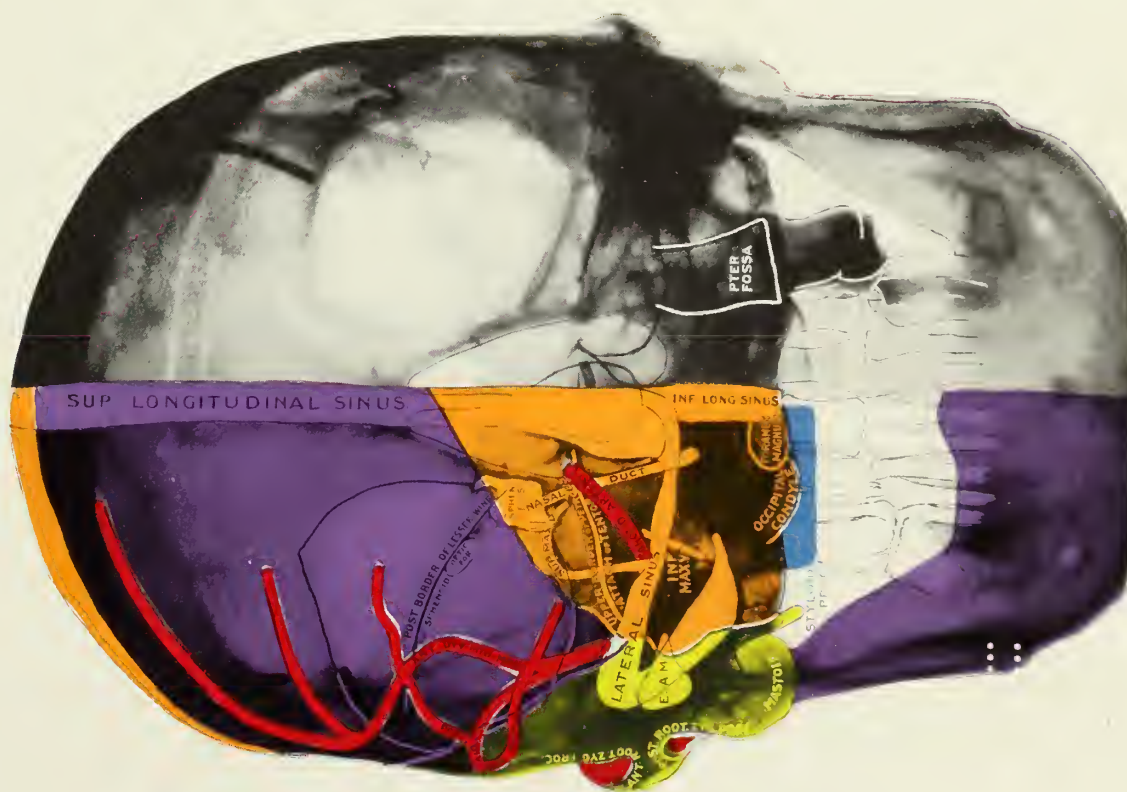


PLATE No. 9.

PLATE No. 11.

PLATE No. 11.

The Anterior two-thirds of skull, with the upper portion of Cranium and the lower jaw removed.

The Antrum, the Ethmoidal and Sphenoidal Sinuses, and the Pterygoid Fossa have been injected with bismuth wax.

For diagrammatic purposes, the shadows thrown by the opaque contents of these cavities have been marked throughout by a pattern characteristic for each cavity.

FIGS. 1, 2, 3, 4, and 5.—Varying relations of shadows of Antrum, Pterygoid Fossa, and Ethmoidal and Sphenoidal Sinuses, according as the angle between the Naso-Meatal Plane and the axis of the rays varies from 90° to -30° .

FIG. 6.—Lateral view.



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An X-ray atlas of
the skull.

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